3D Echocardiography:
New Toys, New Rules

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Outline

• New toys: understand the technology
• New rules: tips for better 3D images
• Playing together: tips for better interventional imaging
New Toys:
Understand the Technology
Basic Knowledge: 2D vs 3D

2D
- Familiarity
- Higher temporal/spatial resolution
- Better Color Doppler
- Difficult orientation in complex anatomy
- Challenging guidance

3D
- Entire volume
- Procedure guidance
- Reconstructed planes not available in 2D
- Low frame rate
- Learning curve

Complementary: use both!
Applications

Established
- LVEF / Volumes
- Valve assessment
  - Native
  - Prosthetic
- Non-valvular structures
- Guidance

Emerging
- LVOT sizing for TAVR
- Valvular disease – quantification
- 3D RVEF
- 3D strain
TEE
Mitral Valve Prolapse / Flail

P1

P2

P3
New Rules:
Tips for Better 3D Images
Improving your 3D: Tip #1

Start imaging in 3D!
Improving your 3D: Tip #2

Start simple

• Normal anatomy
• Easy target
• Large volume
Aortic valve

LAA

Coronary bypass
Improving your 3D: Tip #3

Be patient

- Steady hand
- Breath / ventilator hold for multi-beat
- Post-processing
Without ventilator holding

With ventilator holding
Improving your 3D: Tip #4

Take advantage of 3D

• Rotate as needed
• Mirror volumes
Non-functional cleft
Rotate as needed
Mirror Volumes

FR 11Hz
7.5cm

3D Beats 1
Improving your 3D: Tip #5

**Color 3D**

- Get 3D structure in view
  - Color suppress
  - HVR
  - Gain / compression
- When optimal, get multibeat clip, adjust low velocity filter / tissue transparency
Color Filter Settings
Improving your 3D: Tip #6

Dealing with 3D TTE acquisition
LV volumes, LVEF
Stitch artifact in multibeat
Playing Together: Tips for Interventional Imaging
Interventional Imaging: Tip #1

Develop common language with cath lab team
3D TEE

- Aortic valve
- LAA
- Septum
- 9
- 12
- 3
- 6
Procedure Guidance
Trans-septal Puncture

IVC
SVC
Posterior
Ao

PAT T: 37.0°C
TEE T: 39.7°C

62 bpm
Interventional Imaging: Tip #2

Full volume, single beat for live imaging at procedure guidance
MitraClip: Guidance in LA
The MitraClip Wish List

1. Presence of a Flail Leaflet (yes/no)

2. Flail gap > 10 mm? (yes/no)

3. Flail width > 15 mm? (yes/no)

4. A2/P2 location? (yes/no)

5. Primary jet location (central/medial/lateral)

6. > 1 primary jet? (yes/no)

7. Secondary jet location (central/medial/lateral)

8. Posterior mitral leaflet length (mm) : measured in LVOT (grasping) view from point of leaflet insertion into annulus to leaflet tip at site of regurgitant jet

9. Commissural prolapse (yes/no)

10. Primary jet width at leaflet level (mm) (typically measured in the commissural view)

11. Mean gradient pre-clip

12. Mean gradient post-clip

13. Presence of mitral annular calcification (any degree, yes/no)

14. Leaflet calcification (including MAC extending into leaflets) (yes/no)

15. Leaflet perforation (yes/no)

16. Functional leaflet cleft (defined as cleft with associated MR) (yes/no)

17. Mitral annular area

18. Mitral valve area during maximal opening
Interventional Imaging: Tip #3

3D Measurements: Multiplanar or en-face?
Always smaller
79 year old with torrential TR
FORMA Repair System

- **Spacer**
  - Positioned into the regurgitant orifice
  - Creates a platform for native leaflet coaptation

- **Rail**
  - Tracks Spacer into position
  - Distally and proximally anchored

<table>
<thead>
<tr>
<th>Coaptation Device Diameter</th>
<th>Sheath Size (Fr)</th>
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<tbody>
<tr>
<td>Ø12mm</td>
<td>20</td>
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<tr>
<td>Ø15mm</td>
<td>20</td>
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3D: New Toys, New Rules

• 2D and 3D are complementary
• 3D Image optimization tips
  • Large volume for orientation
  • Be patient (breath-hold, post-processing)
• Color 3D – optimize anatomic structure, then color
• 3D TTE: multislice for LVEF, RVEF

Tips for interventional imaging
• Common language with interventionists
• Use multiplanar reconstruction for measurements

Start Imaging in 3D
Thank You!

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